

## Investigation of genesis and fluid origin in Noghduz gold bearing quartz veins, East Azarbaijan Province, northwest of Iran

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**Abstract:** The Noghduz prospecting area, as a part of the Arasbaran metallogenic zone is located about 20 km east of Ahar, East-Azarbaijan Province. The mineralization host rocks are andesite-trachy andesite with the age of Late Eocene. The hydrothermal alterations exposed in this area are silicic, argillic, and propylitic. Pyrite is the main hypogene sulfide mineral which is accompanied by lesser amounts of chalcopyrite and bornite. The most important supergene minerals in this area are iron oxyhydroxides (hematite, limonite and goethite) and malachite that accompany the hypogene mineral assemblage. Gold mineralization occurred within quartz-sulfide veins/veinlets in this area. The microthermometric measurements in the primary 2-phase (L+V) fluid inclusions in quartz crystals associated with mineralization indicate that the mineralizing fluids had temperatures and salinities within the range of 160-334°C and 0.53-3.39 wt% NaCl equivalent, respectively. The presence of hydrothermal breccias, pseudomorph of quartz after bladed calcite, and mono-phase gas inclusions are indicative of boiling of the hydrothermal fluids responsible for mineralization. The sulfur isotopic analysis of pyrite shows that the values of isotopic composition of this element is close to the range of magmatic source. Also, the oxygen and hydrogen isotopic data demonstrated that the meteoric waters constituted a great portion of the ore-bearing fluids at Noghduz area. The presence of structural and textural evidence along with fluid inclusion studies (salinity and homogenization temperature) indicate that the gold mineralization at Noghduz area is of epithermal type.

**Keywords:** *Fluid inclusions; stable isotopes; epithermal gold; Noghduz; Ahar; East-Azarbaijan.*

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